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ABSTRACT

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A HEALTH EDUCATION PROGRAM FOR PARENTS AND CHILDREN WHO EXHIBIT HIGH RISK FACTORS OF CORONARY HEART DISEASE

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ABSTRACT

CORONARY HEART DISEASE EDUCATION FOR FAMILIES WHO EXHIBIT HIGH RISK FACTORS

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This study demonstrated the feasibility of joint parent-child education to change the behaviors known to be associated with increased risk of coronary heart disease. Earlier studies have shown that parents who are at increased risk of coronary heart disease can be identified by studying certain factors in the children. Utilizing a combined risk index factor which included ponderal index, blood pressure, smoking habits, and serum cholesterol, the students in the 7th and 11th grades in the Yucaipa (California) School District were ranked according to risk. The families of the highest sixty children were then screened for the same factors; a baseline of physical fitness status was also obtained.

An educational intervention consisting of classwork and practice in food preparation, cholesterol control, weight control, smoking cessation and physical fitness, was instituted for five months. Participants were post-tested for the original factors at the close of the series, and again six months later. Results showed a significant improvement in the behaviors associated with increased risk, and a consequent lowering of the factors themselves. Parents and children ranked family members as their chief source of support in achieving the desired behavior change, indicating that joint parent-child education increases the effectiveness of that education.

Purpose of the Study

This study was designed to explore the feasibility, and to test the effectiveness of behavior change, through a health education program for school age children and their parents who exhibit the known risk factors of coronary heart disease.

Review of Literature

Medical history has repeatedly shown in retrospective and prospective studies that an individual has an increased likelihood of developing coronary heart disease if he has elevated levels of serum cholesterol, blood pressure, body weight, and a history of smoking (1). This is evident in an adult population, but can these findings of coronary heart disease be related to adolescence and younger age children?

Pediatric studies have been directed in this area of childhood diet and coronary heart disease (2,3,4,5,6,7,8,9,10,11). What cannot be ignored is the parental influence on the child; thus other studies have revealed significant associations between fathers and their children for cholesterol and blood pressure levels and ponderal index values as they relate to coronary heart disease (12,13,14).

Ibrahim, et al, in 1971 explored the possibility of identifying coronary-prone middle-aged men by studying their children (15). Seventy-one percent of the available 11th grade students in a Buffalo, N.Y. high school were studied for serum cholesterol, blood pressure, uric acid levels, skinfold thickness, height and weight. Children with a high score in four of the variables combined allowed identification of two-thirds of the coronary-prone fathers. Seventy-eight percent of the fathers who gave histories of myocardial infarction were identified through their children. Ibrahim concluded that "identification of a large portion of coronary-prone adults through captive child population may provide an ideal group at risk for testing the efficacy of primary prevention measures. The well-defined nature of this group of fathers as well as its accessibility and apparent motivation would provide many of the essential elements required in achieving the aims of preventive trials." (15:582).

Meyer and Henderson, in a study aimed at multiple risk factor reduction for the prevention of cardiovascular disease, compared the efficacy of behavior modification and modeling techniques in individual counseling with that of a single-time physician consultation (16). Using the criteria of weight loss, maintenance of weight loss, dietary improvement, cholesterol and triglyceride reduction, they discovered that behavior modification treatment proved to be the most powerful technique for the multivariate change and change maintenance attempted. However, individual counseling treatment also demonstrated significant strength in achieving and maintaining change.

Lauer and associates, in the Muscatine (Iowa) study of coronary heart disease risk factors in children (17), conclude that "the identification of such children, in addition to the benefits for themselves, may also allow the discovery of other family members with coronary risks because of the known clustering of hyperlipidemia, hypertension and obesity within family members: (17:705). They further suggest that education for both children and parents may prove to be most remunerative because of the higher motivational level of both parents and children following coronary heart disease risk factor screening.

Objectives

The objectives of this pilot study were to determine the feasibility of utilizing a combined parent-child educational approach in the reduction of known coronary risk factors. It was proposed to measure the effectiveness of this educational approach by measuring a reduction in serum cholesterol levels, reduction in weight, cessation of smoking, and increasing the level of physical exercise both in total amount and regularity.

Methodology

The population of this study was all students who were available for screening in the 7th and 11th grades of the Yucaipa (California) Joint Unified School District. After the initial screening, the students were ranked according to the RFI (Risk Factor Index) developed for the purposes of this study, and the highest 60 were taken into the group for educational intervention.

Credit for the development of the Risk Factor Index used in this study is due the Department of Biostatistics and Epidemiology, Loma Linda University School of Health. Their major assumption was that risk factors such as cholesterol and blood pressure probably behave in a linear fashion as the age of the individual increases (Fig. 1). Therefore, a person would tend to maintain the same relative position in the distribution of a given risk factor among persons of his same age and sex. Thus, a child whose cholesterol level was above the 90th percentile would likely be above the 90th percentile as an adult.

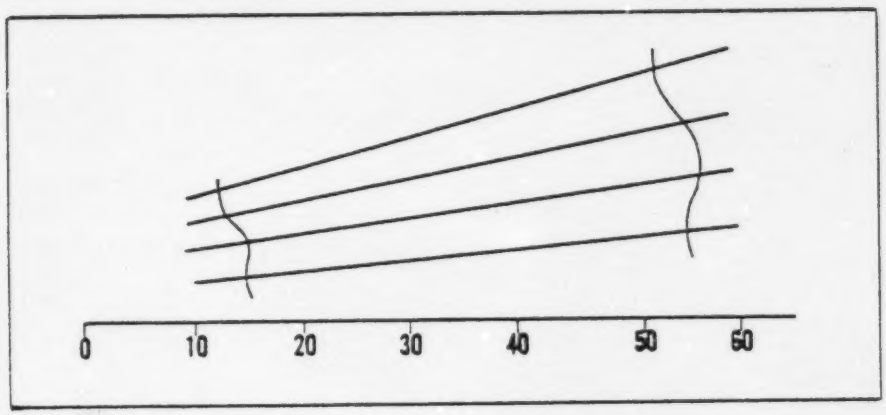


Figure 1: Percentile Risk Factor Level
Each line represents an individual.

The method for distributing the child on the coronary risk scale was obtained by the following:

(1) For each child a percentile rank was estimated for each of the following risk factors from the existing data for that age group from the National Health Survey and other large surveys (18,19,20): blood pressure, cholesterol, and weight in relation to height.

(2) For each child the above percentile was employed to find the risk factor value of a Framingham subject of the same sex (21) when the child would be 50-54 years old.

(3) Known data from the Framingham study (22) was then used to calculate the probability of developing coronary heart disease in the next ten years for a Framingham subject of the same sex who has the same relative ranking for risk factors as the child. This allowed the students to be ranked in their order of likelihood of developing coronary heart disease when they would be 50-54 years of age.

The initial screening was held at the respective schools and included the following measurements: (a) height and weight; (b) skinfold, triceps; (c) blood pressure, taken three times separated by at least 15 minutes each. A questionnaire regarding lifestyle (smoking habits, parents' smoking habits, heart disease history, exercise patterns, perception of weight, and perception of parents weight).

The four significant factors for analysis were: weight measures (combined into a ponderal index), diastolic blood pressure, smoking and cholesterol level. Information was key punched for rapid retrieval and analysis.

The parents were screened by the same techniques for the same risk factors as were the teenagers. In addition, a pre-assessment of physical fitness status was made on all students and parents in the target group to provide a data base for determining improvement in exercise patterns. Students were tested with the California Physical Fitness Test, already in use in the California public schools. Parents were tested with the Kasch Step Test.

The educational intervention took the form of two-hour group sessions weekly for 20 weeks. All participants attended two general information sessions. From there, groups were divided according to the participants' choice: those with overweight problems

attended weight control, those with high cholesterol in the dietary control of cholesterol. Other groups which met were devoted to physical fitness and food preparation. Sessions were alternated, so that participants could, during the course of 20 weeks, attend all four of these sessions if they chose to do so. General sessions on stress control were also included. Those who chose to stop smoking attended a locally held smoking cessation program (The Five-Day Plan). An optional exercise program was available three evenings per week for those families wishing to participate.

Educational methodology employed was small group discussion, lecture, behavior modification techniques (in weight control), values clarification, the use of overhead transparencies, movies and role-playing. Food preparation demonstrations were done by color videotapes; practice sessions included actual food preparation in the home economics classroom by the families.

Following the five months' educational intervention, a post-assessment of the students and parents was performed. Criteria for success were considered as:

1. a lowering of the cholesterol level of 20% or more;
2. a lowering of weight by 5% of more;
3. cessation of smoking, if a person smoked; and
4. a change in exercise patterns toward more vigorous exercise, more often, maintaining a high level of exercise.

The same group of parents and children were retested six months later, or one year from the time of the original screening, to determine maintenance level of desired changes.

The study was conducted between October 1976, and November 1977. Students in the Master of Public Health and Doctor of Health Science degree programs at the School of Health conducted the screening, assisted in analyzing the data, planned and carried out the educational intervention. Each student accepted the responsibility of three or four families in the study, giving individual counseling in addition to the group sessions.

Results of the Study

Of the 364 11th graders in Yucaipa High School, 97 (26.6%) chose to be screened. From this number, the highest 20 were invited with their families to participate in the educational intervention. Of the 396 7th graders in the Yucaipa Intermediate School, 166 (41.9%) chose to be screened. From this number, the highest 40 participated in the educational program.

Of the 60 families thus selected, two families were unable to continue beyond the first session. During the first ten weeks of the program, 89% of the adults and 91% of the students indicated that they attended a majority of the sessions. During the last 10 weeks of the sessions, only 31% of the adults and 34% of the students attended regularly.

Table 1 gives the results of the changes in cholesterol level among the students in the study. Seventy-one percent of the students were able to achieve a lowering of their cholesterol beyond the criteria set for success*. Only 3% of the students showed an increase of cholesterol after the one-year study. The range of cholesterol levels shows a marked decrease.

Table 1

Students: Cholesterol

Range of Values		Time Intervals	% Respondents Decreased	% Respondents Remained Constant*	% Respondents Increased
Nov. 76	136-276	Nov. 1976-Nov. 1977 N = 35	71%	26%	3%
May 77	140-241	Nov. 1976-May 1977 N = 23	13%	57%	30%
Nov. 77	120-222	May 1977-Nov. 1977 N = 35	51%	46%	3%

*An acceptable level of laboratory error in cholesterol determination is plus or minus 10%. Cholesterol levels were considered as remaining constant if they were within that range.

Table 2 shows the results in cholesterol changes for the adult participants. 65% of the adults were able to lower their cholesterol to meet the criteria for success in the study, while 8% regressed, and showed higher cholesterol levels at the close. The range of cholesterol levels does not show the marked decrease, however, that it does with the students.

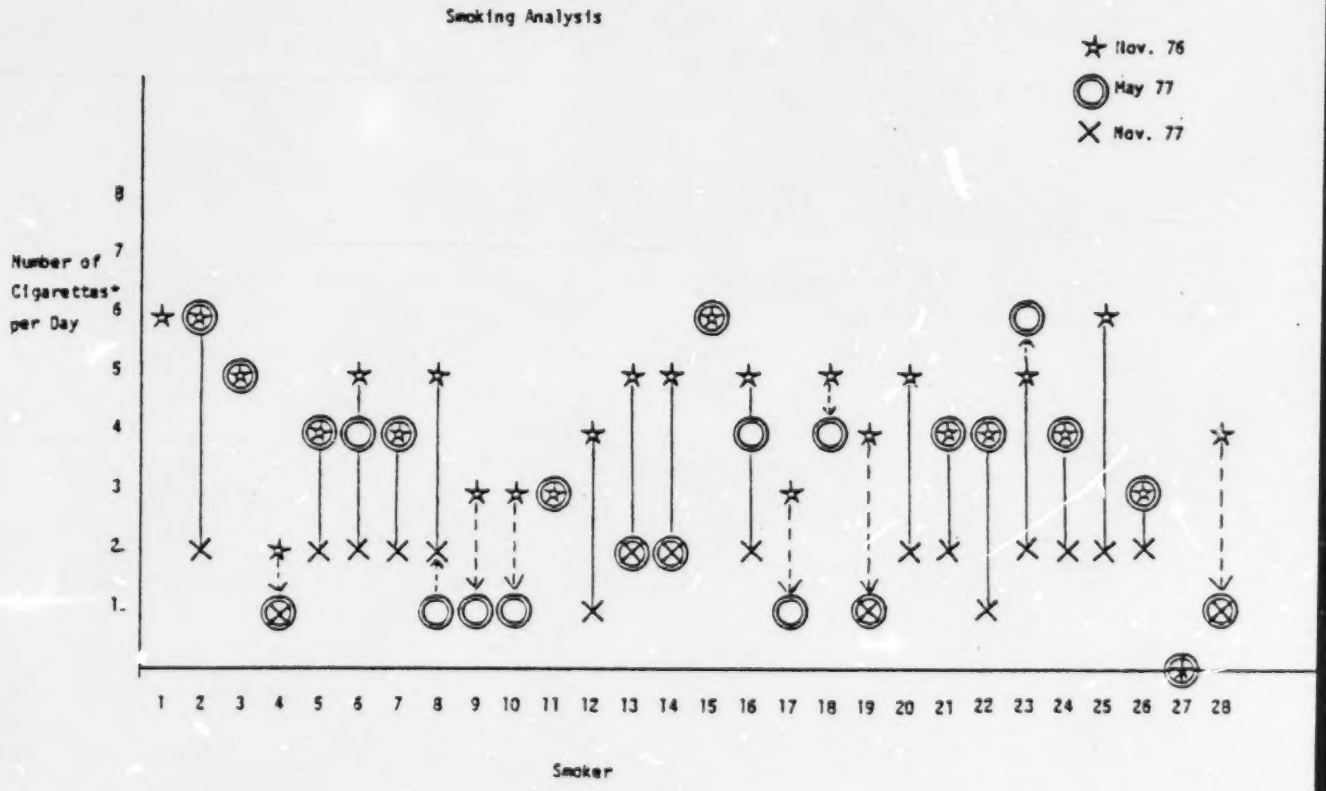
Table 2

Adult: Cholesterol

Range of Values		Time Intervals	% Respondents Decreased	% Respondents Remained Constant*	% Respondents Increased
Nov. 76	159-378	Nov. 1976-Nov. 1977 N = 63	65%	27%	8%
May 77	142-375	Nov. 1976-May 1977 N = 86	24%	62%	14%
Nov. 77	138-329	May 1977-Nov. 1977 N = 61	51%	39%	10%

*An acceptable level of laboratory error in cholesterol determination is plus or minus 10%. Cholesterol levels were considered as remaining constant if they were within that range.

Table 3 compares the smoking habits of adult participants in the study. Self-selection by the students during the initial screening eliminated all but one of the smoking students; this student chose not to attempt smoking cessation during the study. Nine smokers were able to stop smoking, and an additional fourteen were able to reduce the amount of their smoking to the level of 1-4 cigarettes per day. A closer look at this table will show that many of these made the change <u>after</u> the close of the educational intervention.



* 1 - None
2 - 1-4
3 - 5-14 (1/2 pack)
4 - 15-24 (1 pack)
5 - 25-34 (1 1/2 packs)
6 - 35-44 (2 packs)
7 - 45-54 (2 1/2 packs)
8 - 55 or more (more than 2 1/2 packs)

Table 3

Table 4 shows the weight changes for the adults. Student weight changes were not considered since many were growing rapidly during this study, and their weight was increasing, rather than decreasing. Results here indicate that 30% of the adults were able to lower their weight enough to meet the criteria of 5% weight loss during the year-long study, but 38% actually increased their weight during the same period.*

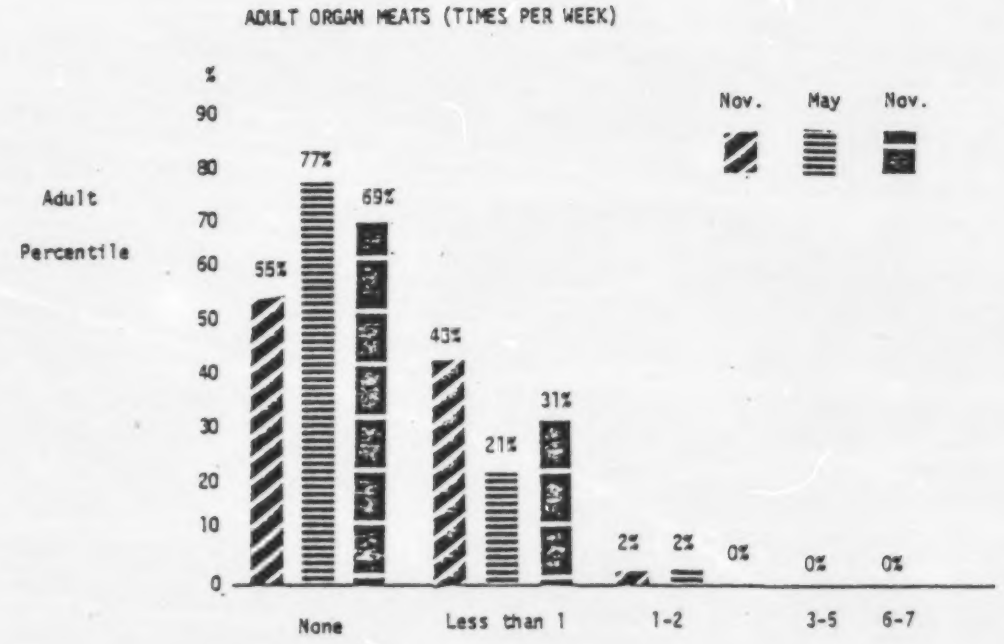
Table 4

Adult: Weight

Time Intervals	% Respondents Decreased	% Respondents Remained Constant*	% Respondents Increased
Nov. 1976 - Nov. 1977 N = 63	30%	32%	38%
Nov. 1976 - May 1977 N = 86	31%	35%	34%
May 1977 - Nov. 1977 N = 61	21%	59%	20%

*A weight change of 2% was considered as remaining constant.

Tables 5-11 illustrate the changes in food choices, as revealed by the completion of the dietary survey instrument. Significant changes were made in each of these areas during the time of the educational intervention, but these changes were not necessarily maintained at that level after the six-month period of no contact.



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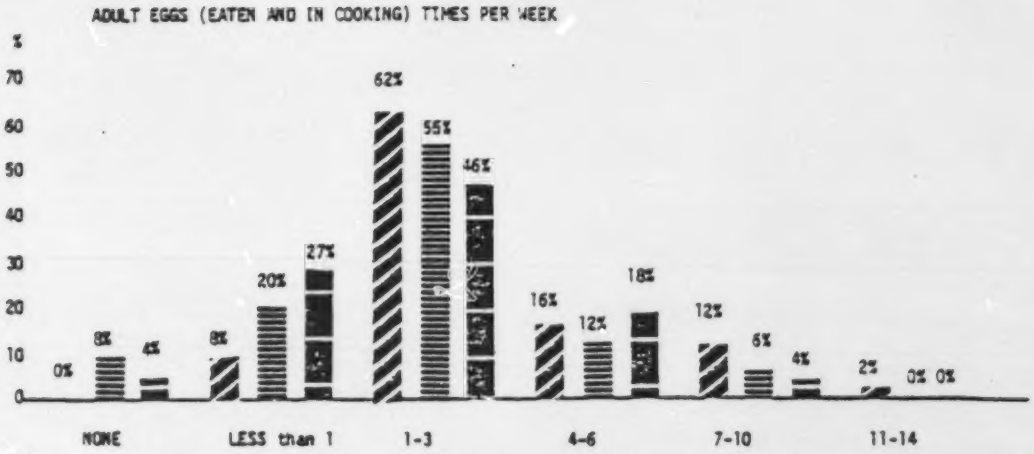

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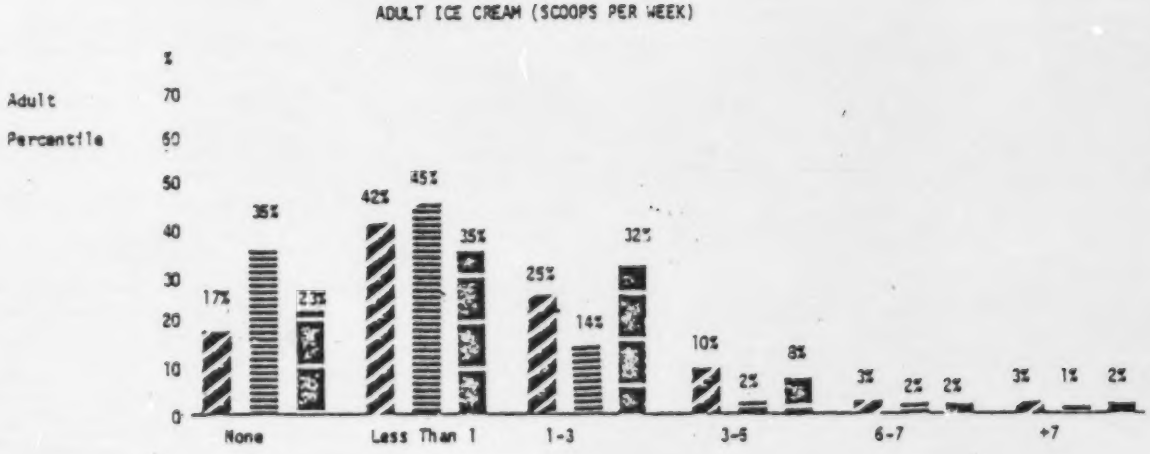

Table 7

ADULT FRUIT (SERVINGS PER DAY)

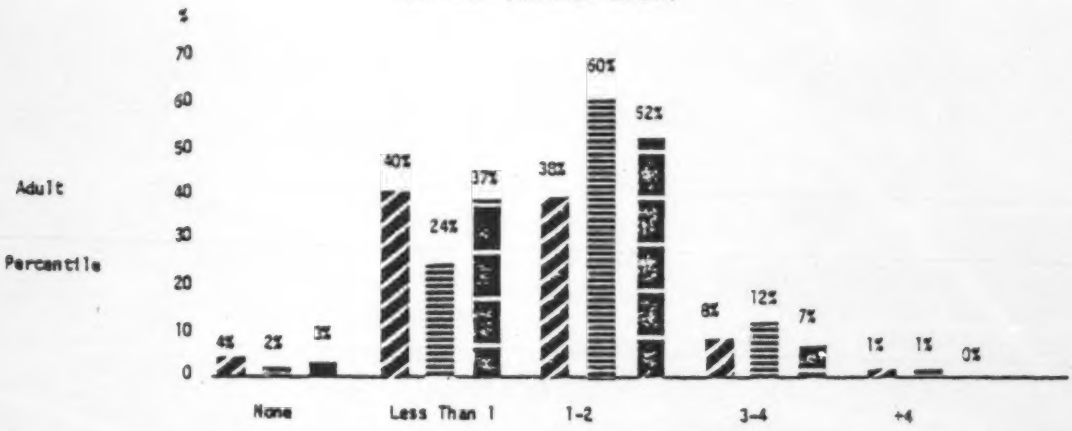

Table 8

BUTTER, LARD OR MEAT DRIPPINGS (used in cooking)

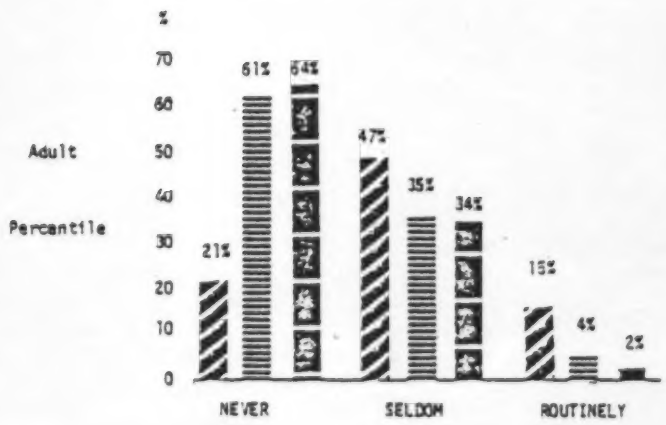

Table 9

STUDENT BEEF (STEAK OR HAMBURGERS)
TIMES PER WEEK

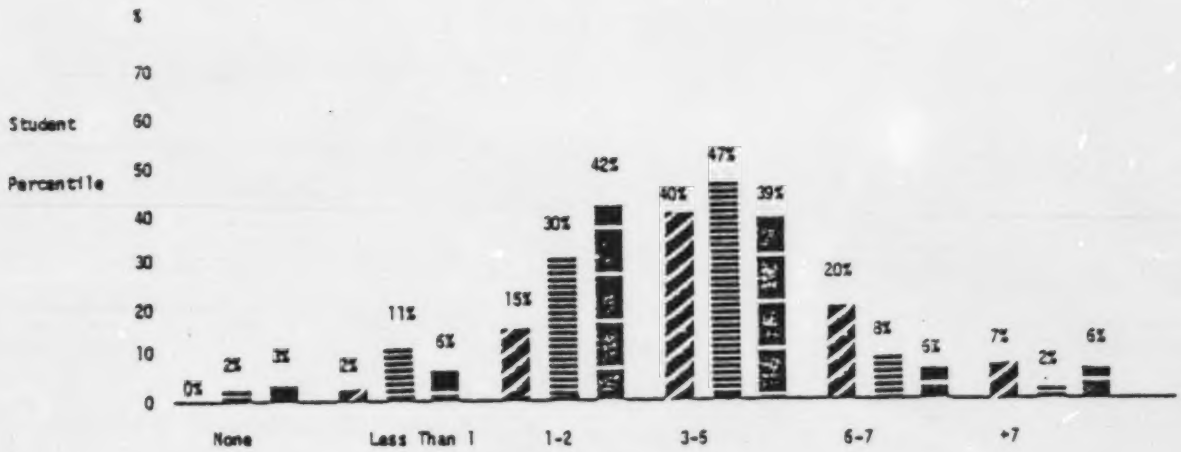

Table 10

STUDENT EGGS (EATEN AND IN COOKING)
TIMES PER WEEK

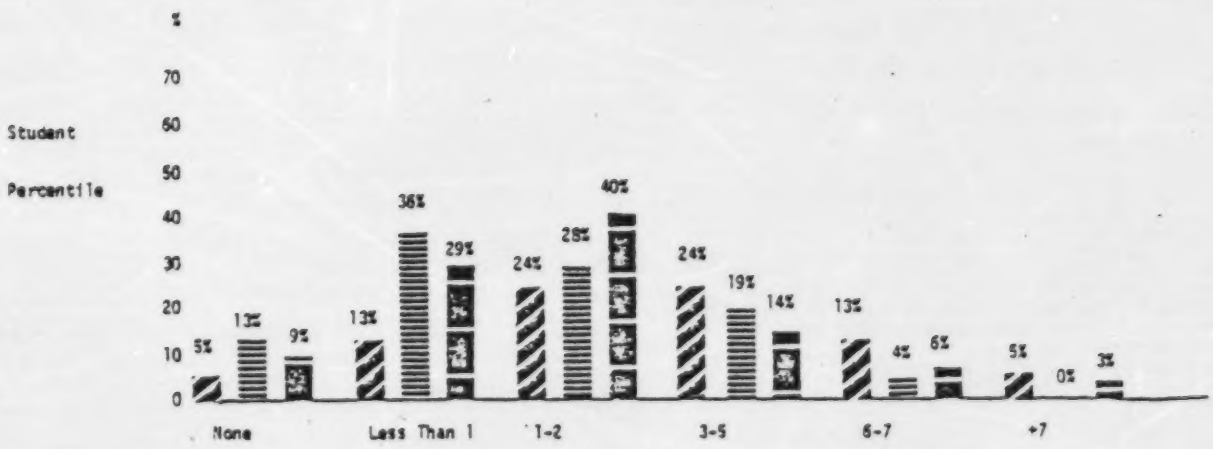

Table 11

On a self-evaluation questionnaire, 77% of the students, and 82% of the adults said that they had made positive changes. Over half of the families indicated that a family member was most helpful in making the positive health behavior change. The remainder indicated that the health professionals (students and faculty) from Loma Linda University were helpful in aiding them to make the behavior changes.

Discussion

The combined risk index factor, developed from the Department of Health, Education and Welfare tables of youth height and weight, and the Framingham (Massachusetts) Coronary Heart Disease Study, appears to be a valid way of locating the families who are at high risk of coronary heart disease. Indeed, three of the students thus identified had fathers who were already deceased due to coronary heart disease. A family history was not taken at the time of the initial screening, nor was it included as part of the RFI, yet many families, when contacted, expressed amazement at having been located without the aid of family information.

A drawback to this kind of study, and a factor to be considered when looking at the results, is the degree of self-selection inherent in the original screening process. Students and parents must be willing to be screened, and sign a consent form permitting the testing, including the invasive technique of venipuncture for the cholesterol determination. Many students, particularly the 11th grade students, refused to consider testing which included this procedure. Additionally, students who thought their smoking or degree of overweight might incriminate them, chose to avoid the screening procedure; this operated to a much larger extent among the 11th graders.

The researchers feel that the data support the use of this approach, however. Even with the limitation of reaching only those who choose to be reached, the higher risk individuals among this group were able to make behavior changes that resulted in marked

lowering of two of the known risk factors, namely smoking and cholesterol levels. The fact that adolescents were able to lower their cholesterol levels to an even greater extent than did the adults appears to hold promise for this type of education early in life. Very little data has appeared in publication about changes in cholesterol at this age level; the ranges determined in this study indicate the kind of changes that may be expected in future studies.

That the data on weight changes indicate mixed results is not surprising to those involved in weight control education. Long-term rates of success are hard to come by. More successful means of educational intervention are obviously indicated here.

Data on the changes in physical fitness levels was insufficient for a valid analysis. At the beginning of the study, it was thought to use the information on physical fitness testing from the physical education departments of the Intermediate and High Schools. However, the gathering of this information was overlooked and not done until near the close of the study, when it was discovered that it was unavailable for most of the students. Therefore, while the students were post-tested, there was no data from pre-tests with which the results could be compared. For the adult physical fitness changes, many of the adults refused to be retested in May and November screening periods, thus leaving too few in the sample for statistical significance.

Changes in levels of physical activity were indicated by both students and adults on the self-evaluation questionnaire. However, no changes reached the level of statistical significance.

A weakness discovered in the process of this study was the type of instrument used for self-reporting of behavior changes. It failed to be specific enough in the areas of physical activity levels and in levels of stress. The questionnaire asked many questions in the area of food selection which did not appear useful in the study, and which should be eliminated in future studies of this type.

Summary and Conclusions

The feasibility of working with family groups to reduce the known risk factors of coronary heart disease was demonstrated; over half of those making behavioral changes listed a family member who had attended as being most helpful to them. The effect of group education, plus the interest of and counseling by a health professional, was demonstrated by meeting the criteria of a 20% reduction in cholesterol (71% of the students and 65% of the adults) and by a smoking cessation or drastic reduction on the part of 78% of the smokers. The goal of 5% weight reduction was met by only 30% of the adults, while 38% showed an increase in weight.

Behavior change, as reported by the participants, showed marked changes in several areas of food selection and preparation known to be related to cholesterol levels. Based on the epidemiological evidence available at this point in time, these changes in behavior, if continued, should result in lowered risk of coronary heart disease. Family education, begun when children are young, offers much promise in achieving permanent behavior change, in leading a lifestyle conducive to coronary heart health.

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